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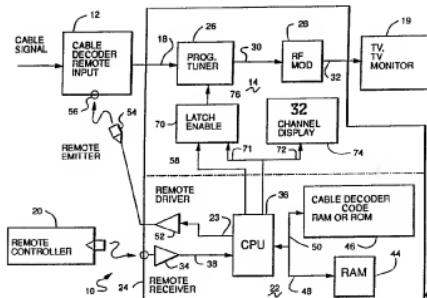
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(54) Title: CABLE TELEVISION DECODER TO TELEVISION ACCESSORY INTERFACING

(57) Abstract

A system (10) interfaces a cable television decoder (12) to a VCR (14) incorporating a television scheduling system. The cable signal is supplied to the cable decoder (12) on cable (16) and the decoded output of the decoder (12) is supplied to the VCR (14) through cable (18) on a fixed channel. The VCR (14) receives commands from its remote controller (20). A cable decoder remote control emulator (22) is connected at (23) between the VCR (14) and the cable decoder (12). All channel selection codes supplied to the VCR (14) by its remote controller (20) are converted by the remote control emulator (22) to command codes recognized by the cable decoder (12). The remote control emulator (22) also suppresses execution of the channel selection codes supplied to the VCR (14), in order to keep the VCR (14) tuned to the fixed channel on which the decoded cable signal is supplied. The remote control emulator (22) drives an infrared emitter, which is positioned in front of an infrared input on the cable decoder (12). Thus, the remote control emulator (22) replaces the conventional cable decoder remote controller. The user communicates with the system using the VCR remote controller (20). For the user, the system (10) appears to function in the same manner as would the VCR (14) connected to the TV (19) with no cable decoder (12) present.



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CABLE TELEVISION DECODER TO TELEVISION ACCESSORY
INTERFACING"

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates generally to a cable television (CATV) decoder interface. More particularly, it relates to such an interface for connecting the cable television decoder to a television accessory, such as a video cassette recorder (VCR). Most especially, it relates to such an interface which maintains full functionality of the television accessory while connected to the decoder.

2. Description of the Prior Art:

Cable television decoders typically operate by requiring a television set and a VCR connected to the decoder to be set to a predetermined channel, such as channel 2, 3 or 4, and all channel selection is accomplished by the decoder. This presents problems for unattended recording, in that not all of the advanced features available on state-of-the-art VCRs can be used while the VCR is under control of the decoder.

Two Zenith Electronics Corporation technical papers disclose systems which attempt to deal with this problem. Merrell, "Tac-Timer," 1986 NCTA Technical Papers, pp. 203-206, discloses a smart remote controller to solve the unattended programming problem when a cable decoder

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5 precedes a VCR. In lieu of programming the VCR, the smart
 remote controller is programmed to turn on a VCR at
 specific times to record desired programs. However, this
 remote controller does not coordinate channel selection
10 for such devices as television schedule systems, such as
 disclosed in my U.S. Patent 4,706,121, issued November 10,
 1987, nor does it support unique features of more advanced
 VCRs. For example, this controller does not support on-
15 screen VCR programming, even if that feature is otherwise
 available on a VCR. The controller does not include any
 capability for conveying information about a channel
 selected on the cable decoder unit to a television
 schedule system or a VCR in any useful way.

15 Long, "The VCR Interface," 1986 NCTA Technical
 Papers, pp. 197-202, discloses two solutions for the
 unattended programming problem when a cable decoder
 precedes a VCR. The first of these is a VCR baseband
 decoder, also called BASE-TAC, and currently marketed by
 Zenith as MultiPort or MP. MPs allow the core functions
20 (descrambling and addressing) of a cable decoder to be
 added to TVs and VCRs. The decoder accepts the baseband
 output of the TV or VCR tuner, eliminating the need for a
 separate decoder tuner and attendant need to coordinate
 two tuners. This method is effective for supporting
25 television schedule systems and allows full functionality
 of advanced VCR features. However, the MP alternative
 requires new TV or VCR equipment and is not compatible
 with the existing installed base of cable decoders. This
 method has not been well-received at this time. The
30 second is the VCR Interface, which uses RF switching and a
 centralized approach for all TVs and VCRs in the home. It
 descrambles incoming CATV channels and, after modulation,
 combines them back onto the CATV cable at unused upper
 channels. The result is that any TV set on the cable can
35 receive premium channels without a separate decoder. This
 method eliminates the need for redundant decoders at every

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TV set or VCR. As described, the system was conceived for only one premium channel. To support a television schedule system, all premium channels must be descrambled together and be available simultaneously. If not, it would be necessary to provide a way of tuning the centralized descrambler from any TV set or VCR attached to the cable. Such a scheme would be awkward when more than one TV or VCR competes for control of the single descrambler. The VCR interface may be implemented using retrofitted decoders, but the overall cost may be prohibitive for the average home.

A somewhat similar system for use with the German television networks is described in Sommerhauser, "Video Programm System: Flexibel programmieren mit VPS," Funk-schau, No. 25, December 1985, pp. 47-51.

Other prior art relating to CATV, its decoders, and programmable remote devices includes West German Published Application 2,338,380, published February 13, 1975; U.K. Patent 1,554,411, published October 17, 1979; U.S. Patent 4,375,651, issued March 1, 1983 to Templin et al.; U.S. Patent 4,394,691, issued July 19, 1983 to Amano et al; U.S. Patent 4,802,114, issued January 31, 1989 to Sogame. While the prior art relating to cable decoder interfaces and similar devices is a well-developed one, a need remains for further development of such devices. None of the existing interfaces both provides a complete solution to the problem of unattended recording and is compatible with already installed equipment.

30 **SUMMARY OF THE INVENTION**

Accordingly, it is an object of this invention to provide a single tuning arrangement which will coordinate channel selection information between a cable decoder and a television schedule system, a VCR or any television device.

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It is another object of the invention to provide such a tuning arrangement which is compatible with already installed equipment.

5 It is a further object of the invention to provide such a single tuning arrangement which preserves the advanced features of television devices when operating behind cable decoders.

The attainment of these and related objects may be achieved through use of the novel system and method for interfacing a cable television decoder to a television accessory herein disclosed. A system for interfacing a cable television decoder to a television accessory in accordance with this invention has the cable television decoder with an input for receiving television signals 10 including a plurality of channels and an output for directing a selected channel from the television signals to a television or television accessory. A programmable tuning means is connected to the output of the cable television decoder to receive the selected channel on a fixed channel from the cable television decoder, for 15 selecting a desired television channel signal. A means is connected to the programmable tuning means for inhibiting the programmable tuning means from tuning to the selected television channel when the cable television decoder is 20 operational. A means for emulating the channel selecting commands of the cable television decoder means is connected to the means for emulating, for transmitting emulated channel selecting commands from the means for 25 emulating to the cable television decoder. A means is coupled to the means for emulating, for making television 30 channel selections.

The method of this invention interfaces a cable television decoder having an input for receiving television signals including a plurality of channels and an output for directing a selected channel from the television signals to a television or television accessory. The 35

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selected channel is received on a fixed channel from the cable television decoder at a programmable tuning means for selecting a desired television channel signal. The programmable tuning means is inhibited from tuning to the 5 selected television channel when the cable television decoder is operational. Television channel selections are made. The channel selecting commands of the cable television decoder corresponding to the television channel selections are emulated. The emulated channel selecting 10 commands are transmitted to the cable television decoder.

The attainment of the foregoing and related objects, advantages and features of the invention should be more readily apparent to those skilled in the art, after review of the following more detailed description of the invention, taken together with the drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of a system for interfacing a cable television decoder to a television accessory 20 in accordance with the invention.

Figure 2 is a more detailed block diagram of the system shown in Figure 1.

DETAILED DESCRIPTION OF THE INVENTION

Turning now to the drawings, more particularly to Figure 1, there is shown a system 10 for interfacing a cable television decoder 12 to a VCR 14 incorporating a television scheduling system of the type disclosed in my above-referenced issued U.S. Patent 4,706,121. As is conventional, the cable signal is supplied to the cable decoder 12 on cable 16, and the decoded output of the decoder 12 is supplied to the VCR 14 through cable 18 on a fixed channel. The decoded output on the fixed channel is also selectively supplied to a television set 19, as indicated at 21. The VCR 14 receives commands from its 30 remote controller 20. A cable decoder remote control 35

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emulator 22 is connected at 23 between the VCR 14 and the cable decoder 12. All channel selection codes supplied to the VCR 14 by its remote controller 20 are converted by the remote control emulator 22 to command codes recognized
5 by the cable decoder 12. The remote control emulator 22 also suppresses execution of the channel selection codes supplied to the VCR 14, in order to keep the VCR 14 tuned to the fixed channel on which the decoded cable signal is supplied.

10 When the cable decoder mode is selected, channel indicator 74 (Figure 2) of the VCR will show the channel selected by the cable decoder unit. There are two reasons for using the VCR 14 to display the channel number instead of the cable decoder 12: The cable unit may now be hidden
15 from sight, which is desired by most users, and it provides improved infrared isolation of the VCR remote controller 20 signal from unwanted pickup by the cable decoder remote input 56 (Figure 2). The benefit of using the VCR 14 for channel display is that the cable decoder unit 12 can be made transparent to the user.
20

The remote control emulator 22 drives an infrared emitter, which is positioned in front of an infrared input on the cable decoder 12. Thus, the remote control emulator 22 replaces the conventional cable decoder remote controller. The user communicates with the system using the VCR remote controller 20. For the user, the system appears to function in the same manner as would the VCR 14 connected to the TV 19 with no cable decoder 12 present. This means that all functions, including on screen
25 programming and the TV schedule system, provided with the VCR 14 are fully functional and are operated uniformly by the user and interact with the user uniformly.
30

Further details of portions of the VCR 14 and the cable remote emulator 22 are provided in Figure 2. As indicated at 24, the remote emulator 22 is supplied together with the VCR 14. The VCR 14 includes a program-

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mable tuner 26 connected to an RF modulator 28 by cable 30. The cable decoder 12 is connected to the programmable tuner 26 by the cable 18, and the RF modulator 28 is connected to the TV 19 by cable 32. The remote controller 20 supplies its inputs to a remote receiver 34 in the cable remote emulator 22. The remote receiver 34 is connected to a central processing unit (CPU) 36 by line 38. The CPU 36 is implemented with a commercially available microprocessor integrated circuit, such as those available from Intel Corporation, Santa Clara, California or Motorola, Inc., Phoenix, Arizona. The CPU 36 is connected to a random access memory 44 and to a cable decoder code memory 46, which may be either a random access or a read only memory, by busses 48 and 50. The CPU 36 is connected to a remote driver circuit 52 by the line 23. The remote driver circuit 52 is connected to an infrared emitter 54, which is positioned in front of remote input 56 of the cable decoder 12. The CPU 36 is connected to the programmable tuner 26 through a latch 70 by lines 71 and 76 and to a channel display 74 by line 72. The latch 70 is also connected to the CPU 36 by line 58. The latch 70 allows the channel data to be shown on the display 74 to be separated from data which is supplied to the programmable tuner 26. Data is supplied to the programmable tuner 26 only when the latch is enabled on line 58.

In operation, the cable remote emulator 22 is either programmed to learn the cable decoder 12 remote controller codes in the conventional manner for teaching a remote controller to learn the commands of a foreign controller, which are then stored in the cable decoder code memory 46, or the memory 46 contains conversion codes stored in ROM for the more popular cable decoder 12 models. The TV schedule system, which also utilizes the CPU 36, is set to the cable mode by a command from the remote controller 20. This causes the programmable tuner 26, also forming part

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of the TV schedule system, to be non-responsive to the remote controller 20 channel commands, as a result of a suitable control signal on line 58, so that the tuner will remain tuned to the fixed channel for the cable decoder 12, typically channel 3 or 4. However, the channel commands are stored in memory 44. Whenever the TV schedule system requires channel information, it will refer to the stored channel information. For example, when the TV schedule system is opened, it will point to the channel currently being viewed/recorded. When a program is selected from the TV schedule system, the system will automatically generate codes recognizable by the cable decoder 12 to change the channel on the cable decoder 12. When a cable input is not being used, the latch 70 is enabled on line 58, so that channel commands on line 71 are supplied to the programmable tuner 26.

Remote controller 20 commands are infrared coupled to the CPU 36 and stored in memory 44. When the system 10 includes a cable decoder 12, all channel tuning commands from the remote controller 20 are inhibited in favor of cable decoder channel commands recognized by the cable decoder and produced by the CPU 36 through conversion from the channel tuning commands. The conversion code is contained in a ROM, or a RAM if the system 10 has a "learn" mode. After a delay to prevent potential conflict of two infrared signals, the converted code is coupled to the cable decoder remote input 56 by the infrared emitter 54. The process of emulating codes recognizable by the cable decoder 12 is done in a conventional manner known in the art. All other commands from the remote controller 20 are acted upon in the system 10 unchanged.

It should now be apparent to those skilled in the art that a novel system for interfacing a cable television decoder to a television accessory capable of achieving the stated objects of the invention has been provided. The system and method provides a single tuning arrangement

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which will coordinate channel selection information between a cable decoder and a television schedule system, a VCR or any television device. The tuning arrangement is compatible with already installed equipment. The 5 single tuning arrangement preserves the advanced features of television devices when operating behind cable decoders.

It should further be apparent to those skilled in the art that various changes in form and details of the 10 invention as shown and described may be made. It is intended that such changes be included within the spirit and scope of the claims appended hereto.

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WHAT IS CLAIMED IS:

1. A system for interfacing a cable television decoder having an input for receiving television signals including a plurality of channels and an output for directing a selected channel from the television signals to a television or television accessory, which comprises:

5 a programmable tuning means, connected to the output of said cable television decoder to receive the selected channel on a fixed channel from said cable television decoder, for selecting a desired television channel signal,

10 means, connected to said programmable tuning means, for inhibiting said programmable tuning means from tuning to the selected television channel when said cable television decoder is operational,

15 means for emulating the channel selecting commands of said cable television decoder,

20 means, connected to said means for emulating, for transmitting emulated channel selecting commands from said means for emulating to said cable television decoder, and means, coupled to said means for emulating, for making television channel selections.

25 2. The system of Claim 1 in which said means for transmitting the emulated channel selecting commands comprises an infrared transmitter positioned to direct the emulated channel selecting commands to an input of said cable decoder for remote control signals.

30 3. The system of Claim 2 in which said means for making television channel selections comprises a remote control unit having an infrared transmitter.

35 4. The system of Claim 1 in which said means for making television channel selections additionally includes

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means for setting a desired activation time for a channel selection, said system further including a memory connected to said means for emulating for storing television channel selections and desired activation times for the television channel selections.

5. The system of Claim 1 in which said means for emulating supplies television channel selections to said programmable tuning means when said cable television decoder is not operating.

10. The system of Claim 1 in which said means for emulating and said means for transmitting are implemented with a microprocessor.

15. The system of Claim 6 in which said means for inhibiting is implemented with a latch connected between said microprocessor and said programmable tuner to receive a signal identifying the selected television channel, said 20 latch also being connected to said microprocessor to receive a latch enable signal.

25. The system of Claim 7 in which said microprocessor is connected to said television accessory to provide the signal identifying the selected television channel to a display of said television accessory.

30. The system of Claim 1 additionally comprising a means, on said television accessory, for displaying a selected channel.

35. 10. A method for interfacing a cable television decoder having an input for receiving television signals including a plurality of channels and an output for directing a selected channel from the television signals to a television or television accessory, which comprises:

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receiving the selected channel on a fixed channel from said cable television decoder at a programmable tuning means for selecting a desired television channel signal,

5 inhibiting said programmable tuning means from tuning to the selected television channel when said cable television decoder is operational,

 making television channel selections,

10 emulating the channel selecting commands of said cable television decoder corresponding to the television channel selections, and

 transmitting the emulated channel selecting commands to said cable television decoder.

15 11. The method of Claim 10 in which the emulated channel selecting commands are transmitted by infrared.

12. The method of Claim 11 in which the television channel selections are made with infrared.

20

13. The method of Claim 10 additionally including the step of setting a desired activation time for a channel selection.

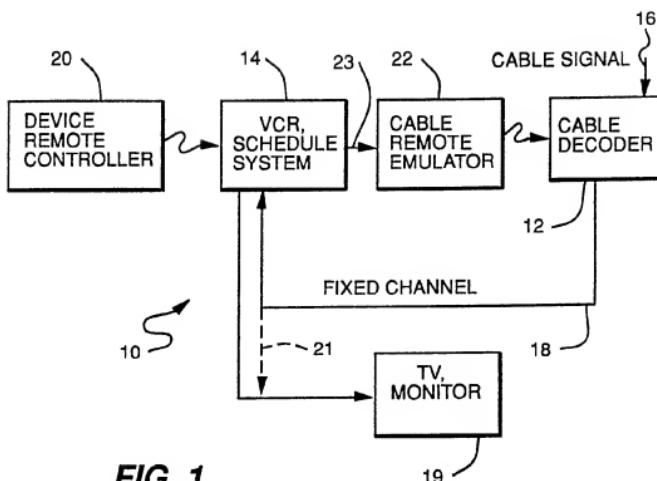
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14. The method of Claim 10 in which said means for emulating supplies television channel selections to said programmable tuning means when said cable television decoder is not operating.

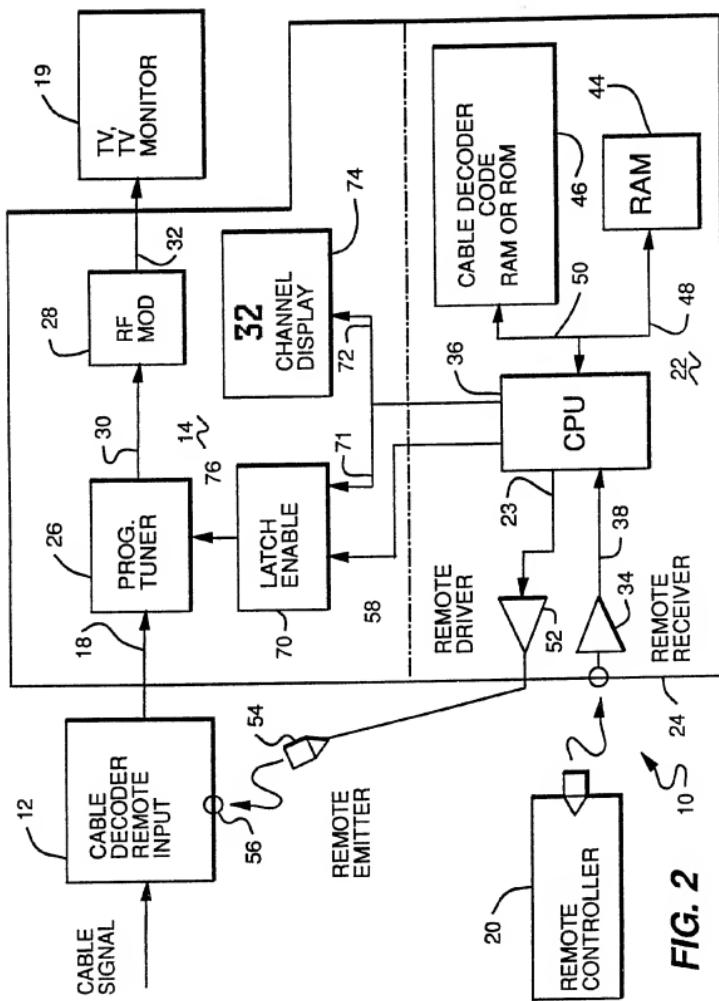
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15. The method of Claim 10 additionally comprising the step of displaying the selected channel on a display of said television accessory.

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**FIG. 1**

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**FIG. 2**

INTERNATIONAL SEARCH REPORT

International Application No PCT/US90/05914

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)³

According to International Patent Classification (IPC) or to both National Classification and IPC

INT. CL⁵ H04N 5/44, 7/10; H04B 1/16, 3/50
 U.S. CL 455/3, 603; 358/86, 191.1, 194.1

II. FIELDS SEARCHED

Minimum Documentation Searched⁴

Classification System	Classification Symbols
U.S. CL.	358/86, 181, 191.1, 194.1 455/3, 4, 6, 603

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁶	

III. DOCUMENTS CONSIDERED TO BE RELEVANT¹⁴

Category [*]	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
Y	1986 NCTA Technical Papers, 1986, Michael E. Long, "The VCR Interface", Pages 197-202 (Note Figure 5 of the drawings and page 199)	1 - 15
A	U S, A, 4,841,368 (Rumbolt et. al) 20 JUNE 1989	
A	U S, A, 4,527,194 (Sirazi) 02 JULY 1985	
A	U S, A, 4,737,993 (DeVilbiss) 12 APRIL 1988	
A	U S, A, 4,706,121 (Young) 10 NOVEMBER 1987	
A	U S, A, 4,394,691 (Amano et. al.) 19 JULY 1983	
A	U S, A, 4,802,114 (Sogame) 31 JANUARY 1989	
A	U S, A, 4,375,651 (Templin et. al.) 01 MARCH 1983	

^{*} Special categories of cited documents:¹³^{"A"} document defining the general state of the art which is not considered to be of particular relevance^{"E"} earlier document but published on or after the international filing date^{"L"} document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)^{"O"} document referring to an oral disclosure, use, exhibition or other means^{"P"} document published prior to the international filing date but later than the priority date claimed^{"T"} later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention^{"X"} document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step^{"Y"} document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the combination is compared with one or more other such documents, such combination being obvious to a person skilled in the art^{"&"} document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search²

29 JANUARY 1991

Date of Mailing of this International Search Report²

07 FEB 1991

International Searching Authority¹

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Signature of Authorized Officer²

TONY P. CHIN

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, ¹⁴ with indication, where appropriate, of the relevant passages ¹⁵	Relevant to Claim No. ¹⁴
A	DE, A, 2,338,380 (Korting Radio) 13 FEBRUARY 1975	
A	1986 NCTA Technical Papers, 1986, Richard G. Merrell, "TAC-TIMER", Pages 203-206	
A	Funkschau, No. 25, December 1985, W. Sommerhauser, "Video Programm System: Flexibel Programmieren Mit VPS", Pages 47-51	
A	Radio Shack Owner's Manual, Cat. No. 15-901, "Universal Remote Control", Pages 3, 9 and 11	